

## REMARKS

The specification has been amended to correct typographical errors which were inadvertently overlooked, and to correct the text in those still overlooked instances (among the many corrected) in which the term "polybutene" was used instead of "polyisobutene".

It is noted that all the figures in the drawing are to be labeled as being prior art because the illustrations are of conventional articles in which the product of this invention are now commonly used.

When reviewing the specification, it was noted that the first sentence of the second full paragraph on page 15, beginning at line 17, stated:

"In another embodiment, the TPV blend consists essentially of a vulcanizate of isobutyl or EPR or EPDM rubber and a poly(lower)monoolefin, in *which* at least 10 phr, preferably 20 phr, and most preferably all of a mineral oil conventionally used to render the TPV processable, is substituted with polyisobutene oil."

The pronoun "which" was placed most proximately to the noun "poly(lower)monoolefin" though it qualified the noun "blend". The inapt grammar has been corrected.

With respect to the typographical errors in Table 2 where the oxygen permeability was written without the last zero, the original (first) declaration of the inventor states he missed noting the error. That the numbers in Table 2, each missing the last zero, was an error is evident from Table 1 and 3; it is clear that the correct value was intended. In his third declaration, submitted herewith, he states that one skilled in the art would recognize that the values without the "zeros" would read on a material for which the values are improbably low as the values would indicate that the claimed composition is as gas-impermeable, or more so, than much harder, much higher Mn polyisobutylene rubber. The heading which inadvertently labeled the Table 2 (correctly labeled in the submitted specification) incorrectly in the prior amendment, has been corrected.

When reviewing the claims as they stood when their merits were argued in the oral interview, in effect reiterating and explaining details of the arguments made in the Supplemental Amendment filed the same day, the undersigned attorney failed to note that

each of the independent claims inadvertently stated that “(a)” was “a vinylaromatic-*polyolefin* polyblock copolymer, optionally hydrogenated to include a block of a mono(lower)olefin.”.

Obviously, it is only after hydrogenation that the midblock becomes a polyolefin block.

Since the best mode of the product uses the hydrogenated vinylaromatic-conjugated diene block copolymer as the precursor polymer, the incorrect identification was missed; and the redundancy of the term “vinylaromatic-polyolefin polyblock copolymer” in the claims 1, 16, 22 and 23 (in which latter three claims the error was mechanically reproduced) was inadvertently overlooked.

The basis for the amendment in currently amended claim 1 is found in the specification on page 3, lines 25-26, where it states “(a) a vinylaromatic compound and a conjugated diene polyblock copolymer, optionally hydrogenated to include a block of a mono(lower)olefin, . . .” That the same error in each of the independent claims was simply overlooked is evident from the dependent claims, such as claim 7 defining the block copolymer that could be hydrogenated.

Original claim 3 referred to “the poly(lower)monoolefin”, referring to a polyolefin defined by one having from 2 to 4 carbon atoms (stated at the outset in claim 1). Though the rubbery block of a vinylaromatic compound and a conjugated diene, after being hydrogenated, results in a poly(lower)monoolefin block, one skilled in the art knows that the polyolefin block is chemically bound to the vinylaromatic block; the polyolefin block does not exist apart from the vinylaromatic block. Claim 3 refers to a polyolefin which is not chemically bound to the elastomer but is homogeneously distributed within the elastomer; this polyolefin is referred to in greater detail in claim 5.

Though evident to one skilled in the art, for the sake of clarity, claim 3 has been amended to state “a poly(lower)monoolefin” to emphasize that the polyolefin referred to is chosen from a polymer of an olefin having from 2 to 4 carbon atoms (stated in claim 1). The poly(lower)monoolefin referred to in claim 3 is the same poly(lower)monoolefin referred to in the amended paragraph above (on page 15 of the specification).

The same amendment has been made in currently amended claim 24 above.

The original Second Declaration of the inventor is presented herewith because the executed faxed copy of the Declaration was poorly legible.

It is now clear that the Baranowski et al reference used "PB0400 (polybutylene)" and polyisobutylene rubber; and that polyisobutene oil having a number average molecular weight Mn in the range from 200 to 6000 has very little, if anything, in common with the polymers specified.

PB0400 is a solid semi-crystalline thermoplastic polymer of butene (butylene), not of isobutene (isobutylene), the PB0400 having a Mn well in excess of 100,000.

Polyisobutylene rubber is a crosslinked copolymer of isobutylene with a substantial amount of isoprene, and like PB0400, has a Mn well in excess of 100,000.

Though the issue is now moot, as stated in the Advisory action, the Declaration is also presented to show that the disclosure of the thermoplastic elastomer found useful by Baranowski et al is so all-inclusive as to be insufficiently specific to duplicate their examples 1 and 3. Even substituting the TPV they disclosed, namely Trefsin® or Santoprene® with either Kraton® G 1652 or Kraton® G 2705 failed to produce a useful composition because no plasticizer was added. Though the basis for the Baranowski et al invention was that the composition was "oil-free", the appended declaration of the inventor states he was unable, following the disclosure of the reference, to make a usable composition, usable as a cap-liner or cork, in presently available commercial production equipment.

The rejection of claims 1-11, and 13-24 under 35 U.S.C. §112, first paragraph as containing new matter, is respectfully traversed.

Basis for the rejection is that "There is nothing in the specification as filed (that) would indicate that mineral oil was used."

Ignoring for the moment that the entire thrust of the description of the invention at hand is bedded in the unobviousness of substituting a liquid polyisobutene oil for conventionally used mineral oil, note that, at page 15, lines 17-21, the specification states, "In another embodiment, . . . most preferably all of a mineral oil conventionally used to render the TPV processable, is substituted with polyisobutene oil." Further, at page 18, lines 17-18, the specification states, "The polyisobutene-plasticized TPE is prepared in a conventional manner except that the mineral oil usually used is substituted with polyisobutene oil."

Still further, perhaps Table 1 comparing the composition of the prior art blend with Blends A and B using polyisobutene oil, and Table 3 were overlooked.

With respect to the argument about “the thickness of a liner is in the order of millimeters within microns” is not understood. The oxygen permeation rate is stated in the same dimensions in all instances; the value of 1 mil is 0.001 inch which is 25.4µm.

The reason the word “detackified” was struck from claim 8 because the first office action stated that the word “detackfier” was not art recognized and therefore unclear. Since claim 8 depends from claim 7 which contains the detackifier, it is not necessary to redundantly characterize the product as being detackified. The basis for the use of the word “detackifier” was provided in the response to the first office action. That it is a well-recognized term of art is reiterated in the appended Declaration.

Reverting to the rejection for obviousness over Baranowski et al (WO 02/14171), it is noted that the reference has issued as U.S. Patent No. 6,677,397, and for convenience, reference will be made to the text as printed in the ‘397 patent.

With respect to the office action stating that it cannot agree that Baranowski’s polyisobutene is not an oil, note that the ‘397 patent clearly states, “For example, *butyl rubbers* such as polyisobutylene are desirable because they provide good oxygen barrier properties. Accordingly, the thermoplastic elastomer can be combined with an effective amount of polyisobutylene. Polyisobutylene is available from a variety of suppliers including the Exxon Corporation.” (see col 5, lines 33-38, *emphasis provided*). Butyl 268 polyisobutylene is such a rubber.

The term “butyl rubber” cannot be confused with “polyisobutene oil”. The dictionary provides much detail about the term “butyl rubber”, stating it is a:

“Synthetic rubber produced by copolymerization of isobutene (approx. 98%) with a small proportion of (2%) of isoprene or butadiene. Polymerization is carried out at from -50° to -100°C in a liquid hydrocarbon, with aluminum chloride as a catalyst. Its outstanding property compared with other rubbers is impermeability to gases; it is widely used in inner

tubes and similar gas-retaining applications.

The uncured rubber is tacky, but may be compounded like natural rubber and vulcanized. Butyl rubber has good resistance to chemical attack and aging, even at high temperatures, and is thus used for curing bags, for vulcanizing other rubber items, for curing plywood, and for steam hose and high temperature conveyor belts. It has superior vibration insulation characteristics, but relatively low tensile strength, tear resistance, and abrasion resistance.” (see *The Condensed Chemical Dictionary*, Fifth Edition, Reinhold Publishing Corporation, New York).

Baranowski et al themselves acknowledge the foregoing characteristics of polyisobutene rubber while distinguishing it from polybutylene rubber when they state: “Also, we have observed that the desirable properties described above can be affected by the relative proportions of the compounds used in the liner composition. For example, excess polybutylene will negatively affect the sealability of the liners in relation to the container opening, whereas too little polybutylene can reduce the adhesion of the liner to the inner surface of the closure cap. An amount of polyisobutylene that is significantly lower than the amount used in the composition of the present invention will reduce the oxygen barrier properties, while too much polyisobutylene can make the composition more difficult to process.” (see col 2, line 59 – col 2 line3).

They realized that even a very little polyisobutylene will improve barrier properties, because it is highly gas-impermeable; and, that more (than a very little) will result in an unusable material.

The statement that “While it is true that Baranowski et al discloses that prior art materials encounter problems due to liquid plasticizers, Baranowski in Example 1 implies that patentees overcome this problem by use of a liner.”, is not understood.

Baranowski et al clearly and deliberately avoid using a liquid plasticizer in their composition so as *to make* their “liners”, commonly referred to as “cap-liners”, for caps. This fact implies nothing else. In the Abstract they state: “Liners with improved oxygen barrier properties for use with closure caps are disclosed. The liners are made of a composition that includes a thermoplastic elastomer, polyisobutylene and polybutylene. The liner is adhered to the inner facing surface of a closure cap.” What they state is that using their liners obviates

the use of a liquid plasticizer. The central teaching and entire thrust of their invention is "make a liner without a liquid plasticizer." Applicants have done the opposite.

It is respectfully submitted that the bases for the rejections, and the basis for the obviousness rejection in particular, have been rebutted.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Alfred D. Lobo", written in a cursive style.

Alfred D. Lobo (Reg. No. 24,109)

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GLS-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

*MAIL STOP NON-FEE AMENDMENT (PATENTS) AF*

Applicant: VARMA, Rajesh Kumar  
Title: REMOVABLE SEAL OF ESSENTIALLY GAS-IMPERMEABLE  
THERMOPLASTIC ELASTOMER  
Serial No.: 10/074,070  
Filed: 12 February 2002  
Art Unit No.: 1711 Examiner: Jeffrey C. Mullis  
Docket: GLS-021 Confirmation No.: 6677

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA. 22313-1450

SECOND DECLARATION OF RAJESH KUMAR VARMA

I, Rajesh Kumar Varma, a citizen of India and Permanent Resident in the United States of America, residing at 1310 Bonnie Brae Drive, in the City of McHenry, County of McHenry, and State of Illinois, 60050 do hereby solemnly declare:

1. I am the same person who filed the preceding Declaration and reiterate the facts stated therein as if fully set forth herein.

2. I have studied U.S. Patent No. 6,677,397 to Baranowski et al and have made three compositions A, B and C representative of the composition disclosed and claimed by Baranowski et al.

The '397 patent teaches using a thermoplastic elastomer such as Trefsin® and Santoprene® (see col 5, lines 8 and 17) in an amount in the range from 40 to 70 parts; a butyl rubber such as polyisobutylene (see col 5, line 34) such as Butyl 268 available from Exxon in an amount in the range from 15 to 30 parts; polybutylene such as PB0400 from Bassel Corp

(formerly Montell Corporation); and a microcrystalline wax such as Okerin® 6080H from Honeywell Corp. Butyl 268 polyisobutylene is delivered as a bale of solid rubber and PB 0400 polybutylene is a hard semi-crystalline thermoplastic. Each has a number average molecular weight  $M_n$  in excess of 100,000. Polyisobutylene rubbers are copolymers of polyisobutylene and isoprene. Some of these grades are halogenated for specific purposes. Polyisobutylene oil is an uncrosslinked liquid which has a  $M_n$  in the range from 200 to 6000.

3. I made the three compositions A, B and C using the foregoing components, each in an amount at the mid-point of the range specified for that component in claim 1 of the '397 patent. In composition "A" I used 50 parts of Trefsin 65A. Because using only 50 phr (parts per hundred parts by weight of all ingredients in the composition) of Trefsin 65A in the composition "A" (below) produced a blend which was too hard and difficultly processable, I did not try and duplicate the two examples 1 and 3 given in the '397 patent (which use 65 parts of an unspecified thermoplastic elastomer "that *includes* a homopolymer or copolymer of polypropylene and a butyl-based rubber"). Using 65 parts of the Trefsin A would be impractical for use in production of articles either by compression molding or injection molding. Moreover, since the examples stated "blending approximately 65 parts of the all-inclusively (hence indefinitely) specified thermoplastic elastomer and the total parts (assume by weight) of the ingredients used in each of the examples adds up to 104 parts, I could not know what other unspecified ingredient was included in the elastomer.

Because I knew I could make a more processable composition if I substituted Kraton G 2705 for the Trefsin 65A, I made composition C with 50 parts Kraton® G 2705. Because I did not know whether substituting Kraton® G 1652 would provide better processability, I made composition B, leaving all other ingredients the same as in A and C. I used a small amount of BT 2207 talc in each composition because it helps prevent agglomeration of the polyisobutylene, as noted by Baranowski et al, and because they suggest using it (see col 6, lines 4-9).



TABLE

<u>Ingredient</u>	A	B	C
Trefsin® 65A	50	--	--
Kraton® G 1652	--	50	--
Kraton® G 2705	--	--	50
PB 0400 (polybutylene)	21	21	21
Butyl rubber (PIB)	21	21	21
Okerin 6080	6	6	6
BT 2207	3	3	3
Total	100	100	100
<u>Properties</u>			
Hardness, Shore A	85	72	70
Viscosity @ 67.023/sec	614.2	907.2	374.2
O <sup>2</sup> Barrier*	5500	9500	25000

\* measured as cc.mil/m<sup>2</sup>.day.atm

4. Composition A was marginally processable into a usable article, but the hardness of 85 Shore A was too high. By "marginally processable" I mean that I extruded a homogeneous mixture of the components of blend A through a single screw extruder having four heating zones, the speed of the screw being 50 rpm. The extrudate I obtained was lumpy. I placed a large lump in a compression molding press the platens of which were at 350°F and closed the press at a pressure of about 250 psi. If hardness of 85 Shore A was acceptable, one could use EVA (ethylene vinylacetate) which has excellent barrier properties and has been used, where possible, in the art for several decades.

Composition B was unprocessable in the aforementioned extruder to make a blend usable as either a cork for the mouth of a bottle or a cap-liner for a screw-top bottle.

Composition C was processable but had barrier properties which were unacceptably low for a usable, practical cap-liner. Since the values of "oxygen ingress" provided in the '397 patent are based on cc/package/day/atm, and no details are given about the package, it is not possible to know whether the values obtained would yield practical and usable cap-liners or corks.

5. The processability requirement derives from the necessity to be able to use the composition in presently used processing equipment to make liners or cap-liners, and articles such as corks.

Appended hereto is a graph in which several graphs, each identified by a reference numeral from 1 – 5 are plotted; each is a plot of shear rate (1/sec) along the abscissa (x-axis) and viscosity (Pa-sec) along the ordinate (y-axis) for block copolymer compositions blended in a presently available commercial extruder such as a ???; the various graphs are identified by the following reference numerals:

- 1 – composition A, made with the components specified in Table 1 above.
- 2 – composition B, made with the components specified in Table 1 above.
- 3 – ideal shear viscosity for compression molding.
- 4 – maximum shear viscosity for either compression or injection molding.
- 5 – ideal shear viscosity for injection molding.

Referring to graphs 3 and 5 it is evident that curves confirm the intuitive expectation that injection molding is preferably done with a lower viscosity material than the material which could be used for compression molding for the same given shear rate.

Though not readily evident from the graphs, it is critical that a usable composition have physical properties which allow the composition to be processed in presently available production equipment, whether for compression molding or injection molding. In general, one would like to have the shear rate which is achieved in a commercial extruder, typically in the range from about 10 to 1000  $\text{sec}^{-1}$  because one tries to avoid excessive shear which tends to damage the physical properties of a blend.

Though the maximum shear viscosity for injection molding, represented by graph 4 appears visually to be relatively close to that for the ideal shear viscosity for compression molding (graph 3), it is *not* close in physical properties. The reason is that the shear viscosity is plotted on a logarithmic scale, and that apparently small difference makes the critical difference in a production extruder.

A processable composition which can be either compression molded or injection molded in presently available commercial production equipment is typically required to have a viscosity lower than 800 Pa-sec at 67  $\text{sec}^{-1}$ .

For viscosity, this requirement for compression molding is in the range from about 350 to 800 Pa-sec at  $67 \text{ sec}^{-1}$ ; and, for injection molding in the range from about 200 to 550 Pa-sec at  $67 \text{ sec}^{-1}$ . In other words, whatever the shear rate is in the equipment, the viscosity must be within the stated range with presently used equipment.

Referring to graphs 1 and 2 (corresponding to blends A and B, respectively) it is now evident that these blends will not be, and are not, acceptably processable in presently available commercial equipment.

6. To meet the foregoing requirements, GLS Corporation provides its customers with compositions having a viscosity in the range from about 300 to 800 Pa-sec at  $67 \text{ sec}^{-1}$ .

It is clear to me that the compositions of examples 1 and 3 in Baranowski et al would not be processable in commercially available production equipment.

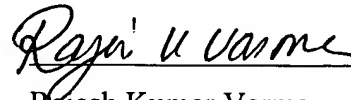
7. Since I have no way of correlating the values given in Table 1 of the '397 reference to the values in conventional units for oxygen permeation rate, I could only try and make a blend which had the values set forth in the column under "622" in Table II (col 9 of the '397 patent). The blend I made did not have the properties stated.

8. I have studied the allegation in the office action mailed 22 April 2004, that "there is no way that those of ordinary skill in the art when viewing applicant's specification as filed would conclude that the oxygen permeation values (set forth in Table 2) are off by a factor of 10." The original values stated, if true, would be data for an essentially oxygen-impermeable polymer such as crosslinked polyisobutylene rubber, such as is used as the inner liner of an automobile tire. Though it would be a great breakthrough to make a polymer suitable for a seal, such as a cork or a cap liner having the oxygen impermeability of such a rubber with the additional physical properties required for a usable cork or cap-liner, one skilled in the art would know right away, that, for the composition stated in the Table 2, the originally stated oxygen permeation values were off by a factor of 10. As I stated in my earlier declaration, I simply overlooked the fact that the zero was missing, probably because I was so used to looking at these numbers that I simply missed the fact.

9. I noted that the final rejection does not acknowledge that the term "detackifier" is a

well known term in the art despite having been given the factual basis for its use. I therefore reiterate that the term is not only well known but used by me almost on a daily basis since many of the products GLS manufactures contain a detackifier. We order it from suppliers under that name, and it is delivered under that name.

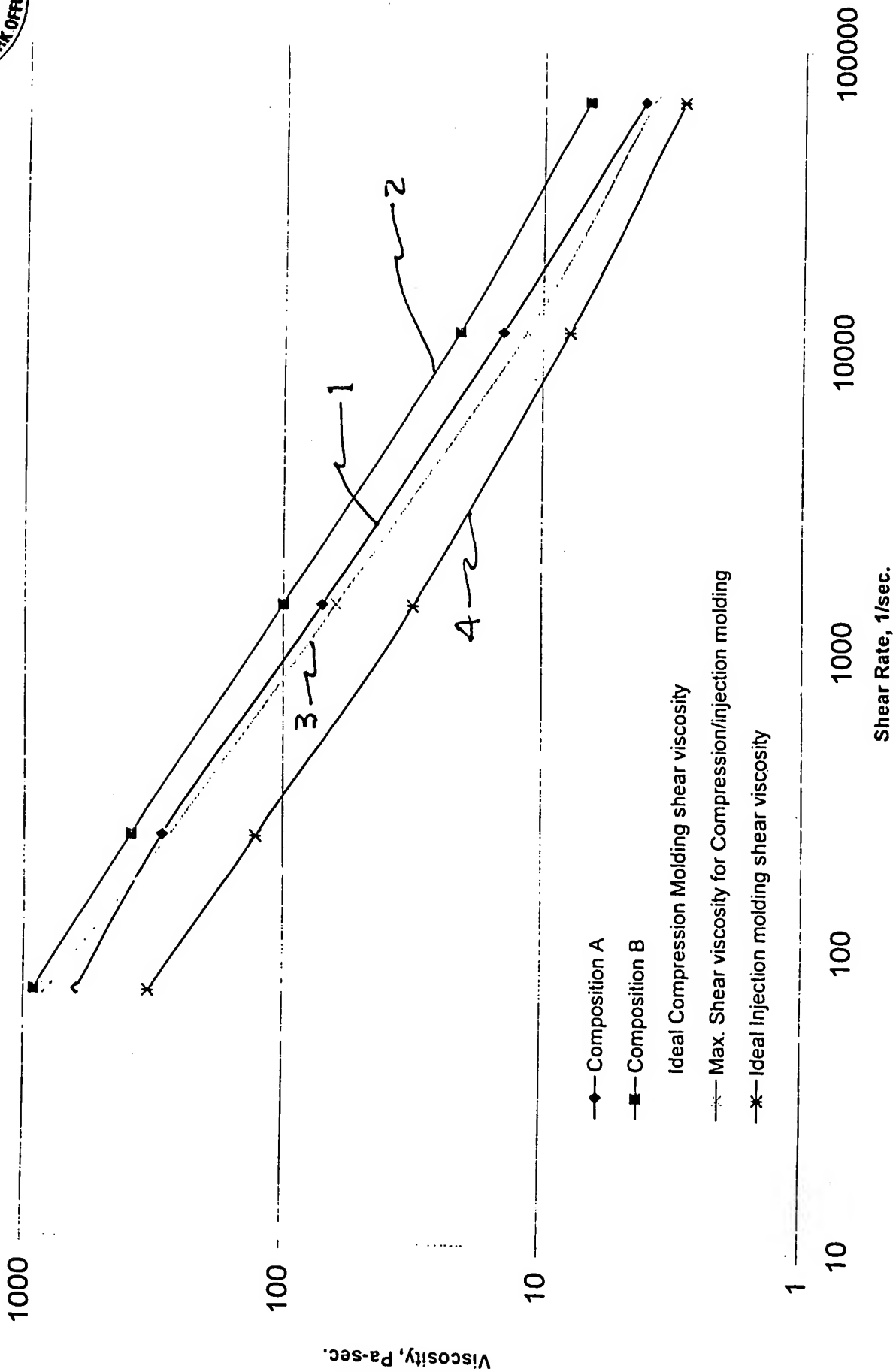
The undersigned declarant declares further that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Rajesh Kumar Varma

Date: 6/16/04

gls/gls-021/prosec/seconddecl/





GLS-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

*MAIL STOP NON-FEE AMENDMENT (PATENTS) AF*

Applicant: VARMA, Rajesh Kumar  
Title: REMOVABLE SEAL OF ESSENTIALLY GAS-IMPERMEABLE  
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Serial No.: **10/074,070**  
Filed: 12 February 2002  
Art Unit No.: 1711 Examiner: Jeffrey C. Mullis  
Docket: GLS-021 Confirmation No.: 6677

Commissioner for Patents  
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Though not readily evident from the graphs, it is critical that a usable composition have physical properties which allow the composition to be processed in presently available production equipment, whether for compression molding or injection molding. In general, one would like to have the shear rate which is achieved in a commercial extruder, typically in the range from about 10 to 1000  $\text{sec}^{-1}$  because one tries to avoid excessive shear which tends to damage the physical properties of a blend.

Though the maximum shear viscosity for injection molding, represented by graph 4 appears visually to be relatively close to that for the ideal shear viscosity for compression molding (graph 3), it is *not* close in physical properties. The reason is that the shear viscosity is plotted on a logarithmic scale, and that apparently small difference makes the critical difference in a production extruder.

A processable composition which can be either compression molded or injection molded in presently available commercial production equipment is typically required to have a viscosity lower than 800 Pa-sec at 67  $\text{sec}^{-1}$ .

For viscosity, this requirement for compression molding is in the range from about 350 to 800 Pa-sec at  $67 \text{ sec}^{-1}$ ; and, for injection molding in the range from about 200 to 550 Pa-sec at  $67 \text{ sec}^{-1}$ . In other words, whatever the shear rate is in the equipment, the viscosity must be within the stated range with presently used equipment.

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9. I noted that the final rejection does not acknowledge that the term "detackifier" is a

well known term in the art despite having been given the factual basis for its use. I therefore reiterate that the term is not only well known but used by me almost on a daily basis since many of the products GLS manufactures contain a detackifier. We order it from suppliers under that name, and it is delivered under that name.

The undersigned declarant declares further that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Rajesh Kumar Varma

Date: 6/16/04